

## Curriculum Vitae, Dr. Kai Hwang

|  |   |
|--|---|
| <b>Mailing Address:</b>                  | <b>Office Tel:</b> (213) 740- 4470                    |
| <b>Professor Kai Hwang</b>               | <b>Office Fax:</b> (213) 740- 4418                    |
| <b>Dept. of EE-Systems, EEB-212</b>      | <b>Adm. Assistant: Rosine Sarafian</b> (213)-740-1251 |
| <b>University of Southern California</b> | <b>Email:</b> kaihwang@usc.edu                        |
| <b>Los Angeles, CA. 90089-2560, USA</b>  | <b>http://GridSec.usc.edu/Hwang.html</b>              |

### **Biographical Sketch:**

**Kai Hwang** is a Professor of Electrical Engineering and Computer Science and Director of Internet and Grid Computing Laboratory at the University of Southern California (USC). He received the Ph.D. in Electrical Engineering and Computer Science from the University of California, Berkeley in 1972. Prior to joining USC in 1985, he has taught at Purdue University for many years. He has served as a visiting Chair Professor during his sabbatical visits at University of Minnesota (1989), National Taiwan University (1992), and University of Hong Kong (1996-99). He has supervised the completion of 20 Ph.D. theses at Purdue and USC in computer science and computer engineering over 35 years of his academic career.

He has authored 4 books and published over 200 scientific papers in refereed Journals, conferences, and book chapters. Most of his 70 Journal papers appeared in IEEE/ACM publications. His popular books on *Computer Architecture* (1983, 1993), *Digital Arithmetic* (1978), and *Scalable Parallel Computing* (1998) and were adapted worldwide and translated into Spanish, Chinese, Japanese, and Korean from the English editions. He has edited 4 research books, including the series of *Annual Reviews in Scalable Computing* (1999-present) and *Parallel Processing for Supercomputers and Artificial Intelligence* (1989).

Dr. Hwang was elected an *IEEE Fellow* in 1986 for making significant contributions in computer architecture, digital arithmetic, and parallel processing. He has served as a distinguished visitor of IEEE Computer Society. He received the very first *K. S. Fu Award* in 2004 from China Computer Federation for his leadership roles in advanced research and higher education on high-performance computer systems and Internet technology. He received the *Outstanding Achievement Awards* from the PDCAT 2002 and PDPTA 1996 Conferences and from the Chinese American Computer Association in southern California.

He is the founding Editor-in-Chief of the *Journal of Parallel and Distributed Computing*. He is also on the Editorial Board of *IEEE Transactions on Parallel and Distributed System* and of the *International Journal of High-Performance Computing and Networking*. He has chaired numerous ACM/IEEE International Conferences and presented over 23 keynote addresses. He has lectured worldwide and performed advisory work for IBM Fishkill, Intel Scalable System Division, MIT Lincoln Lab., ETL in Japan, Academia Sinica in China, and GMD in Germany.

Dr. Hwang has received numerous research grants from the NSF, ONR, AFOSR, IBM, AT&T, MIT Lincoln Lab. As a Principal Investigator, he was awarded a total of \$7 millions research grants from various research agencies, including a 2003 NSF/ITR \$2M grant on Grid security. His research group at USC develops new trust models, game-theoretic strategies, overlay architecture, reputation systems, distributed intrusion detection systems, and security-driven heuristics for trusted computing. Benchmark experiments are carried out on the DETER Internet testbed to prevent Internet outbreaks from spreading network worms and DDoS flooding attacks. For details, visit his personal web site <http://GridSec.usc.edu/Hwang.html>

The citations of his work are summarized in *Google Scholar* in 6800 entries, where his book: *Advanced Computer Architecture* was cited 881 times and the article on single-system image clusters was cited 99 times. (<http://scholar.google.com/scholar?hl=en&lr=&oi=qs&q=Kai+hwang>). With 934 citations in August 2006, the *CiteSeer.Continuity* ranked him at the top 1982 most cited authors out of 790,329 authors in computer science. (<http://Citeseer.ist.psu.edu/cs>). The USC web site has cited him among the top 20 highly-cited faculty members at USC campus. ([http://www.usc.edu/about/faculty/highly\\_cited\\_researchers.html](http://www.usc.edu/about/faculty/highly_cited_researchers.html)).

**Higher Education:**

- Ph.D. in EECS (1972), University of California at Berkeley (Advisor: Prof. Arthur Gill, retired)
- M.S. in EE (1969), University of Hawaii, Honolulu
- B.S. in EE (1966), National Taiwan University, Taiwan, China

**Employment History:**

- 1985 - Present, *Professor of Electrical Engineering and Computer Science*, University of Southern California, Los Angeles, CA.
- 1996 – 1999, *Chair Professor of Computer Engineering*, University of Hong Kong, on sabbatical and special research leave from USC.
- Spring 1989, *CDC Visiting Chair Professor of Computer Science*, University of Minnesota, on sabbatical leave from USC.
- Fall 1991, *Distinguished Professor of Computer Science and Information Engineering*, National Taiwan University, China, on sabbatical leave from USC.
- 1974-1984, *Assistant Professor, Associate Professor, and Professor of Electrical and Computer Engineering*, Purdue University, West Lafayette, Indiana.
- Fall 1979, *Visiting Professor of Electrical Engineering*, Institute of Industrial Sciences, The University of Tokyo, Japan, on sabbatical leave from Purdue University
- 1972 -1974, *Assistant Professor of Electrical Engineering*, University of Miami, Coral Gables, Florida.
- Summer 1972, *Scientist Research Associate*, Lockheed Palo Alto Research Laboratory, Lockheed Missile and Space Co., Inc., Sunnyvale, California.
- 1969 - 1972, *Research Assistant*, Computer Science Group, Electronics Research Laboratory, University of California at Berkeley.

**Honors, Awards, and Citations:**

- *IEEE Fellow* for contributions to the theory, design, and applications of computer architecture, digital arithmetic, and parallel processing, awarded by IEEE Computer Society, 1986.
- *K.S. Fu Award* in recognition of substantial contribution in research and education of high-performance computer systems and to China's computer profession, China Computer Federation, Oct. 18, 2004
- *Distinguished Visitor* of IEEE Computer Society (1981-1984).
- *Board of Directors*, ACM Special Interest Group on Computer Architecture, (SIGARCH), 1990-1992.
- *Academic Achievement Award* for recognition of exceptional academic accomplishments, Chinese Computer Association, Los Angeles, 1994.
- *Outstanding Achievement Award* for dedicated and valued contribution to the fields of parallel and distributed processing techniques and applications, PDPTA '96, Sunnyvale, California, August 9-11, 1996.
- *Outstanding Contribution Award* for excellence in research and education, *Third Int'l Conf. on Parallel and Distributed Computing Applications and Technologies* (PDCAT), Kanazawa, Japan, Sept.4, 2002.
- By January 2006, SCI citation of 54 papers in 478 times and EI citation of 108 papers. He was ranked 1982 out of 790,329 (934 citations) by *CiteSeer.Continuity* as the top 0.25% most cited authors in Computer Science (<http://Citeseer.ist.psu.edu/cs>), August, 2006.

**Journal and Proceedings Editorship:**

- Editor-in-Chief and Co-Founder, *Journal of Parallel and Distributed Computing*, Elsevier, San Diego, 1984 - Present.
- Associate Editor, *IEEE Transaction on Parallel and Distributed Systems*, 2005 – present
- Editorial Board, *International Journal of High-Performance Computing and Networking*, 2005 - present.
- Editor, *Proceedings of the Tenth International Parallel Processing Symposium (IPPS-96)*, IEEE Computer Society, Honolulu, Hawaii, April 15 -18, 1996.
- Consulting Editor, *McGraw-Hill Series in Supercomputing and Parallel Processing*, 1987 - 1990.
- Co-Editor-in-Chief, *Annual Review of Scalable Computing*, Singapore University Press and World Scientific Publishing Co., Volumes 1- 7, 1999 - present.
- Coeditor, *Proceedings of the 1986 International Conference on Parallel Processing*, (ICPP), IEEE Computer Society, St. Charles, Illinois, August 19-22, 1986.
- Editor, *Proceedings of the Seventh Symposium on Computer Arithmetic (ARITH-7)*, IEEE Computer Society, Urbana, Illinois, June 4-6. 1985.

**Scientific Publications:****Textbooks and Research Books:**

1. K. Hwang and Z. Xu, *Scalable Parallel Computing: Technology, Architecture, Programming*, a graduate-level textbook co-authored with Z. Xu, McGraw-Hill Book Company, Feb. 1998 (825 pages). (ISBN 0-07-031798-4.), Chinese translation Shanghai Jiaotong University 2000.
2. K. Hwang, *Advanced Computer Architecture: Parallelism, Scalability, Programmability*, McGraw-Hill Book Co., New York, April 1993. (770 Pages). Chinese translation by Tsinghua University Press, China, August, 1995. Korea translation published Sept. 1997.
3. K. Hwang and F. A. Briggs, *Computer Architecture and Parallel Processing*, a graduate-level textbook by McGraw-Hill Book Co., New York, 1984, (846 pages). Chinese translation by Science Press, China, in 1987. Spanish translation by A. B. Paloma and J. Ruz Ortiz, Univ. of Madrid, Libros McGraw-Hill De Mexico, Spain 1988.
4. K. Hwang, *Computer Arithmetic: Principles, Architecture and Design*, John Wiley & Sons, Inc., Publishers, New York, N. Y. 1979, (423 pages). Chinese translation by Science Press, China, in 1980. Japanese translation by Modern Science Press, Tokyo, Japan, 1980.
5. K. Hwang and D. DeGroot (Editors and Authors), *Parallel Processing for Supercomputers and Artificial Intelligence*, a research reference book, McGraw-Hill Book Co., N. Y., March 1989, (673 pages).
6. K. Hwang (Editor), *Supercomputers: Design and Applications*, A tutorial text by IEEE Computer Society Press, Silver Spring, Maryland, August 1984. (640 pages)
7. C. K. Yuen (EIC) and K. Hwang (Co-EIC), *Annual Review of Scalable Computing*, Singapore University Press and World Scientific Pub. Co., Volumes 1- 6, 1999 - 2004.
8. C. K. Yuen and K. Hwang (Co-Editors), *Annual Review of Scalable Computing*, Singapore University Press and World Scientific Pub. Co., Volume 7, Singapore, 2005

**Chapters in Edited Books: (In reverse chronological order)**

9. Z. Xu and K. Hwang, “Designing Superservers with clusters and Commodity Components”, *Annual Advances in Scalable Computing*, World Scientific, Singapore, 1999.
10. K. Hwang, P. S. Tseng and D. Kim, “An Orthogonal Multiprocessor for Parallel Scientific Computations”, *Architectural Alternatives for Exploiting Parallelism*, edited by David Lilja, IEEE Computer Society Press, Los Alamitos, CA, 1991, pp. 278-293.

11. K. Hwang and D. K. Panda, "The USC Orthogonal Multiprocessor for Image Understanding", Chap. 4 in *Parallel Architectures and Algorithms for Image understanding*, (Prasanna, Editor), Academic Press, New York, 1991.
12. K. Hwang and R. Chowkwanyun, "Multiprocessor Architectural Support for Balanced LISP Processing", Chap. 5 in *Computers for Artificial Intelligence Applications*, (Wah and Ramamoorthy, Editors), John Wiley 1990.
13. K. Hwang and J. Ghosh, "Supercomputers and Artificial Intelligence Machines", Chap.8 in *Computer architecture: Concepts and Systems*, (Milutinovic, Editor), Elsevier Science, New York, 1987, pp. 307-353.
14. K. Hwang, "Exploiting Parallelism in Multiprocessors and Multicomputers," Chap.2 in *Parallel Processing for Supercomputers and AI*, (Hwang and DeGroot, Editors), McGraw-Hill, N. Y. 1989.
15. K. Hwang, R. Chowkwanyun and J. Ghosh, "Parallel Architectures for Implementing AI Systems," Chap. 7, *Parallel Processing for Supercomputers and AI*, (Hwang and DeGroot, Editors), McGraw-Hill, N. Y. 1989.
16. K. Hwang and R. Chowkwanyun, "Multicomputer Load Balancing for Concurrent Lisp Execution."Chap. 9 in *Parallel Processing for Supercomputers and AI*, (Hwang and DeGroot, Editors), McGraw-Hill, N. Y. 1989.
17. K. Hwang, "Parallel Programming Environment and Software Support," Chap.10 in *Parallel Processing for Supercomputers and AI*, (Hwang and DeGroot, Editors), McGraw-Hill, N. Y. 1989.
18. K. Hwang and S. Toborg, "Exploring Optical Computing and Artificial Neural Networks," Chap. 16 , *Parallel Processing for Supercomputers and AI*, (Hwang and DeGroot, Editors), McGraw-Hill, N. Y. 1989.
19. K. Hwang, K. S. Fu and B. W. Wah, "VLSI Architectures for Pattern Analysis and Image Database Management," Chap.25 in *VLSI and Modern Signal Processing*, (Ed. Kung,.), Prentice-Hall, 1985.
20. "VLSI Computer Arithmetic for Real-Time Image Processing," Chap. 2 *VLSI Electronics, Microstructure Science*, Vol. 7, (Einspruch, Editor), Academic Press, N. Y., 1984, pp. 303-331.
21. F. A. Briggs, K. S. Fu, and K. Hwang, "PUMPS: A Shared-Resource Multiprocessor Architecture for Pattern Analysis and Image Database Management," Chap.15 in *Multicomputers and Image Processing*, Academic Press, 1982, pp. 319-330.
22. K. Hwang, S. P. Su and L. M. Ni, "Vector Computer Architectures and Processing Techniques," Chap. 4 , *Advances in Computers*, (Ed. by M. Yovits), Vol. 20, Academic Press, Inc., New York, 1981, pp. 115-197.
23. F.A. Briggs, K. S. Fu, J. H. Patel, and K. Hwang, "A Shared-Resource Multiple Microprocessor System for Pattern Recognition and Image Processing," Chap.11 in *Special Computer Architecture for Pattern Processing*, CRC, Boca Raton, FL. 1982, pp. 221-230.

**Refereed Journal Papers:** ( published or accepted in reverse chronological order up to April 2007)

24. Y. Chen, K. Hwang, and W. S. Ku, "Collaborative Detection of DDoS Attacks over Multiple Network Domains", *IEEE Trans. on Parallel and Distributed Systems* , accepted April 10, 2007 (in press to appear)
25. K. Hwang, M. Cai, Y. Chen, and M. Qin, "Hybrid Intrusion Detection with Weighted Signature Generation over Anomalous Internet Episodes", *IEEE Trans. on Dependable and Secure Computing*, Vol.4, No.1, Jan-March, 2007, pp.41-55.
26. K. Hwang, Y. Kwok, S. Song, M. Cai, Yu Chen, and Ying Chen, "DHT-based Security Infrastructure for Trusted Internet and Grid Computing", *International Journal on Critical Infrastructures*, Vol.2, No.4, December 2006, pp. 412-433.
27. S. Song, K. Hwang, and Y. Kwok, "Risk-Tolerant Heuristics and Genetic Algorithms for Security-Assured Grid Job Scheduling", *IEEE Trans. on Computers*, Vol. 55, No.6, June 2006, pp.703-719.
28. Y. Chen and K. Hwang, " Collaborative Detection and Filtering of Shrew DDoS Attacks with Spectral Analysis", *Journal of Parallel and Distributed Computing*, Special Issue on Security in Grids and Distributed Systems, Vol.66, No.9, Sept. 2006, pp.1137-1151.

29. M. Cai, K. Hwang, J. Pan and C. Papadupolous, "WormShield: Fast Worm Signature Generation with Distributed Fingerprint Aggregation", *IEEE Trans. of Dependable and Secure Computing (TDSC)*, Vol.4, No. 2, April/June 2007.
30. R. Zhou and K. Hwang, "PowerTrust: A Robust and Scalable Reputation System for Trusted Peer-to-Peer Computing", *IEEE Transactions on Parallel and Distributed Systems (TPDS)*, Vol. 18, No.4, April, 2007.
31. Y. K. Kwok, Kai Hwang, and S. Song, "Selfish Grids: Game-Theoretic Modeling and NAS/PSA Benchmark Evaluation", *IEEE Trans. on Parallel & Distributed Systems*, Vol. 18, No.5, May, 2007
32. S. Song, K. Hwang, R Zhou, and Y.K. Kwok, "Trusted P2P Transactions with Fuzzy Reputation Aggregation", *IEEE Internet Computing*, Special Issue on Security for P2P and AD Hoc Networks, Nov/Dec. 2005, pp.18-28.
33. M. Cai, K. Hwang, Y. K. Kwok, S. Song, and Y. Chen, "Fast Internet Worm Containment", *IEEE Security and Privacy*, May/June 2005.
34. S. Song, K. Hwang, and Y. K. Kwok, "Trusted Grid Computing with Security Binding and Trusty Integration", *Journal of Grid Computing*, Vol.3, Nos.1-2, Sept. 2005, pp.53-73.
35. K. Hwang, H. Jin, and R. S. Ho, "Orthogonal Striping and Mirroring in Distributed RAID for I/O-Centric Cluster Computing", *IEEE Trans. on Parallel and Distributed Systems*, Vol. 13, No.2, Feb. 2002. pp.26-44
36. M. Theys, S. Ali, H.J. Siegel, M. Chandy, K. Hwang, K. Kennedy, L. Sha, K.G. Shin, M. Snir, L. Snyder, and T. Sterling, "What are the Top Ten Most Influential Parallel and Distributed Processing Concepts of The Past Millenium", *Journal of Parallel and Distributed Computing*, Vol. 61, Dec. 2001, pp. 1827-1841.
37. S. W. Lin, R. W. Lau, K. Hwang, X. Lin, and P. Y. Cheung, "Adaptive Parallel Rendering on Multiprocessors and Workstation Clusters", *IEEE Trans. on Parallel and Distributed Systems*, Vol.12, No.3, March 2001, pp.241-258.
38. H. Jin and K. Hwang, "Adaptive Sector Grouping to Reduce False Sharing of Distributed RAID Clusters", *Journal of Cluster Computing*, Vol.4, No.2, April 2001, pp.133-143.
39. H. Jin and K. Hwang, "Striped Mirroring Disk Array", *Journal of Systems Architecture*, Vol.46, Elsevier, March 2000, pp.543-550.
40. H. Jin and K. Hwang, "Optimal Striping in RAID Architecture", *Concurrency: Practice and Experience*, Vol.12, Wiley, 2000, pp.909-916.
41. K. Hwang, C. M. Wang, C. L. Wang, and Z. Xu, "Resource Scaling Effects on MPP Performance: STAP Benchmark Implications", *IEEE Trans. on Parallel and Distributed Systems*, May 1999, pp.509-527.
42. K. Hwang, H. Jin, E. Chow, C.L. Wang, and Z. Xu, "Designing SSI Clusters with Hierarchical Checkpointing and Single-I/O Space", *IEEE Concurrency*, Spring Issue, January-March 1999.
43. K. Hwang, "Gigabit Networks for Building Scalable Multiprocessors and Multicomputer Clusters", *Hong Kong Institute of Engineers Transactions*, 50th Anniversary Issue, Hong Kong Institution of Engineers, Vol. 2, No.3, Dec. 1997, pp. 82-87.
44. K. Hwang and Z. Xu, "Scalable Parallel Computers for Real-Time Signal Processing", *IEEE Signal Processing*, July 1996, pp.50-66.
45. K. Hwang, Z. Xu and M. Arakawa, "Benchmark Evaluation of the IBM SP2 for Parallel Signal Processing", *IEEE Trans. on Parallel and Distributed Systems*, Vol.7, No.5, May 1996, pp.522-536.
46. Z. Xu and K. Hwang, "Early Prediction of MPP Performance: SP2, T3D, and Paragon Experiences", *Journal of Parallel Computing*, Vol.22, No.7, October 1996, pp. 917-942.
47. Z. Xu and K. Hwang, "Modeling Communication Overhead: MPI and MPL Performance on The IBM SP2 Multicomputer", *IEEE Parallel and Distributed Technology*, March 1996, pp. 9-23.
48. H. C. Wang and K. Hwang, "Multicoloring of Grid-Structured PDE Solvers for Parallel Execution on multiprocessors," *IEEE Trans. on Parallel and Distributed Systems*, Vol.6, No.11, Nov.1996, pp. 1195-1205.

49. Y. K. Chong and K. Hwang, "Performance Analysis of Four Memory Consistency Models for Multithreaded Multiprocessors", *IEEE Trans. on Parallel and Distributed Systems*, Vol. 6, No.10, October 1995, pp. 1085-1099.
50. S. Shang and K. Hwang, "Distributed Hardwired Barrier Synchronization for Scalable Multiprocessor Clusters", *IEEE Trans. on Parallel and Distributed Systems*, Vol. 6, No.6, June 1995, pp. 591-605.
51. R. H. Saavedra, W. Mao, and K. Hwang, "Performance and Optimization of Data Prefetching Strategies in Scalable Multiprocessors", *Journal of Parallel and Distributed Computing*, Vol. 22, No.3, Sept. 1994, pp. 427-448.
52. J. Xu and K. Hwang, "Heuristic Methods for Dynamic Load Balancing in a Message-Passing Multicomputer", *Journal of Parallel and Distributed Computing*, Vol. 18, May 1993, pp. 1-13.
53. S. Toborg and K. Hwang, "Cooperative Vision Integration Through Data-Parallel Neural Computations", *IEEE Trans. on Computers*, Vol.40, No.12, December 1991, pp. 1368-1379.
54. J. Xu and K. Hwang, "Mapping Rule-based Systems Onto Multicomputers Using Simulated Annealing", *Journal of Parallel and Distributed Computing*, Vol.13, No.4, Dec. 1991, pp.442-455.
55. K. Hwang and D. K. Panda, "Architectural Design of Orthogonal Multiprocessor for Multidimensional Information Processing", *Journal of Information Science and Engineering*, Vol.7, No.4, December, 1991, pp.459-485.
56. K. Hwang and D. K. Panda, "High-Radix Symbolic Substitution and Superposition for Optical Matrix Algebra", *Journal of Optical Engineering*, November 1992, pp. 2422-2433.
57. C. M. Cheng and K. Hwang, "Simulated Performance of a RISC-based Multiprocessor with Orthogonal-Access Memory", *Journal of Parallel and Distributed Computing*, Vol.13, No.1, September 1991, pp.43-57.
58. D. K. Panda and K. Hwang, "Fast Data Manipulation in Multiprocessors Using Parallel Pipelined Memories", Special Issue on Shared Memory Multiprocessors, *Journal of Parallel and Distributed Computing*, Vol. 12, No. 2, June 1991, pp.130-145.
59. K. Hwang, H. M. Alnuweiri, V. Prasanna Kumar, and D. Kim, "Orthogonal Multiprocessor Sharing Memory with Enhanced Mesh for Integrated Image Understanding," *Journal of CVGIP: Image Understanding*, January 1991.
60. K. Hwang, D. Kim and P. S. Tseng, "Orthogonal Multiprocessor for Parallel Scientific Computations", *IEEE Trans. on Computers*, Vol.38, No.1, January 1989, pp. 47-61.
61. A. Louri and K. Hwang, "Optical Multiplication and Division Using Modified Signed-Digit Symbolic Substitution," *Journal of Optical Engineering*, special issue on Optical Computing, April 1989, pp. 364-372.
62. J. Ghosh and K. Hwang, "Mapping Neural Networks onto Message-Passing Multicomputers," *Journal of Parallel and Distributed Computing*, special issue on Neural Computing, Vol. 6, No.2, April, 1989, pp. 291-330.
63. Z. Xu and K. Hwang, "Molecules: A Language Construct for Layered Development of Parallel Programs," *IEEE Trans. on Software Engineering*, Vol.15, No.5, May 1989, pp. 587-599.
64. K. Hwang and Z. Xu, "Multipipeline Networking for Compound Vector Processing," *IEEE Trans. on Computers*, Vol. 37, No.1, Jan. 1988, pp. 33-47,
65. K. Hwang and J. Ghosh, "Hypernet: A Communication-Efficient Architecture for Construction of Massively Parallel Computers," *IEEE Trans. on Computers*, Vol. 36, No. 12, Dec. 1987, pp. 1450-1466.
66. V. Milutinovic, N. Lopez-Benitez and K. Hwang, "A GaAs-based Microprocessor Architecture for Real-Time Applications," *IEEE Trans. on Computers*, Vol. 36, No.6, June 1987, pp. 714-727.
67. K. Hwang, "Advanced Parallel Processing with Supercomputer Architectures," *Proceedings of the IEEE*, October 1987, pp. 1348-1379.

68. K. Hwang, J. Ghosh and R. Chowkwangyun, "Computer Architectures for AI Processing," Special issue on New AI Systems, *IEEE Computer*, Vol.20, No.1, Jan, 1987, pp. 19-27.
69. L. M. Ni and K. Hwang, "Correction to Optimal Load Balancing in a Multiple Processor System with Many Job Classes", *IEEE Trans. Software Engineering*, Vol.12, No.3, 1986, pp.500.
70. W. W. Carlson and K. Hwang, "Algorithmic Performance of Dataflow Multiprocessors," *IEEE Computer*, Vol.18, No.12, December 1985, pp. 30-40.
71. K. Hwang, "Multiprocessor Supercomputers for Scientific and Engineering Application," *IEEE Computer*, Vol. 18, No.6, June 1985, pp. 57-75.
72. S. H. Zak and K. Hwang, "Polynomial Division on Systolic Arrays," *IEEE Trans. on Computers*, Vol. 34, No.6, June 1985, pp. 577-578
73. M. Ni and K. Hwang, "Optimal Load Balancing in a Multiple Processor System with Many Job Classes," *IEEE Trans. on Software Engineering*, Vol.11, No.5, May 1985, pp. 491-496.
74. M. Ni and K. Hwang, "Vector Reduction Techniques for Arithmetic Systems," *IEEE Trans. on Computers*, Vol. 34, No. 5, May 1985, pp. 404-411.
75. Y. Chin and K. Hwang, "Packet Switching Networks for Multiprocessor and Dataflow Computers," *IEEE Trans. on Computers*, Vol. 33, No.11, Nov. 1984, pp. 991-1003.
76. K. Hwang and S. P. Su, "VLSI Architectures for Feature Extraction and Pattern Classification," *Journal of Computer Vision, Graphics, and Image Processing*, Vol. 24, Nov. 1983, pp. 215-228.
77. K. Hwang and K. S. Fu, "Integrated Computer Architecture for Image Processing and Database Management," *IEEE Computer*, Jan. 1983, pp. 51-61.
78. K. Hwang, "Computer Architectures for Image Processing," *IEEE Computer*, Jan 1983, pp. 10-12.
79. T. P. Chang and K. Hwang, "Combinatorial Reliability Analysis of Multiprocessor Computers", *IEEE Trans. on Reliability*, December 1982, pp. 469-473.
80. K. Hwang and Y. H. Cheng, "Partitioned Matrix Algorithms for VLSI Arithmetic Systems", *IEEE Trans. on Computers*, Vol. 31, No.12, December 1982, pp. 1215-1224.
81. F. A. Briggs, K. S. Fu, K. Hwang, and B. W. Wah. "PUMPS: Architecture for Pattern analysis and Image Database Management," *IEEE Trans. on Computers*, Vol.31, Oct. 1982, pp. 969-982.
82. K. Hwang, W. Croft, G. Goble, B.W. Wah, F.A. Briggs, W. Simmons, and C. L. Coates, "A Unix-Based Local Computer Network with Load Balancing," *IEEE Computer*, Vol.15, April 1982, pp. 55-66.
83. L. M. Ni and K. Hwang, "Performance Modeling of Shared Resource Array Processors," *IEEE Trans. on Software Engineering*, Vol. SE-7 No. 4, July 1981, pp. 386-394.
84. K. Hwang and L. M. Ni, "Resource Optimization of A Parallel Computer for Multiple Vector Processing," *IEEE Trans. on Computers*, Vol. C-29, No. 9, Sept. 1980, pp. 831-836.
85. K. Hwang, "Global and Modular Two's Complement Array Multipliers," *IEEE Trans. on Computers*, Vol. C-28, No. 4, April 1979, pp. 300-306.
86. K. Hwang, "On the Periodicity of Regular Languages," *Information and Control*, Vol, 40, No. 2, February 1979, pp. 205-222.
87. K. Hwang and S. B. Yao, "Optimal Batch Searching of Tree-Structured Files in Multiprocessor Computer Systems," *Journal of the Association for Computing Machinery*, Vol. 24, No. 3, July 1977, pp. 441-454.
88. K. Hwang, "On Syntactic Edge Detection in Noisy Pictures," *International Journal of Computer and Information Sciences*, Vol. 6, No. 1, 1977, March 1977, pp. 27-40.
89. K. Hwang, "Digital Chopping for Error Control in Analog Adders," *IEEE Trans. on Industrial Electronics and Control Instrumentation*, Vol. IECI-23, No. 4, November 1976, pp. 378-383.
90. K. Hwang, "Fault-Tolerant Microprogrammed Digital Controller Design," *IEEE Trans. on Industrial Electronics and Control Instrumentation*, Vol. IECI-23, No.4, August 1976, pp. 200-207.

91. J. Mibelli and K. Hwang, "A TTL Programmable Logic Array and Its Application," *IEEE Proceedings*, Vol. 64, No. 3, March 1976, pp. 368-369.
92. K. Hwang, "Some Structural Complexities of Time-Varying Sequential Machines," *International Journal of Computer and Information Science*, Vol. 4, No. 3, September 1975, pp. 237-245.
93. K. Hwang, "Cyclic Decomposition of Finite Stochastic Systems," *Journal of Computer and System Sciences*, Vol. 9, No. 1, August 1974, pp. 56-68.
94. K. Hwang, "Periodic Realization of Synchronous Sequential Machines," *IEEE Trans. On Computers*, Vol. C-22, October 1973, pp. 923-927.

**Pending Journal Papers** (submitted or revised up to July 2007)

95. R. Zhou, K. Hwang, and M. Cai, "Gossip-based Reputation Management in Unstructured Peer-to-Peer Networks", *IEEE Trans. Knowledge and Data Engineering*, (TKDE), submitted Jan. 3, 2007. (under review)
96. X. Lou and K. Hwang, "Proactive Copyright Protection in P2P Content Distribution Networks", *IEEE Trans. on Parallel and Distributed Systems*, under revision July 2007.

**Refereed Conference Papers:** (Published up to June 2007 )

97. Y. Chen and K. Hwang, "TCP Flow Analysis for Defense against Shrew DDoS Attacks", *IEEE International Conf. on Communications (ICC-2007)*, Glasgow, Scotland, June 24-28, 2007.
98. Y. Chen, K. Hwang, and W. Ku, "Distributed Change-Point Detection of DDoS Attacks: Experimental Results on DETER Testbed", *DETER Community Workshop on Cyber Security Experimentation and Test*, in conjunction with the 16<sup>th</sup> *USENIX Security Symposium*, Boston, MA. August 6-7, 2007.
99. R. Zhou and K. Hwang, "Gossip-based Reputation Aggregation in Unstructured P2P Networks", *Int'l Parallel and Distributed Processing Symposium (IPDPS-2007)*, Long Beach, March 27-29, 2007.
100. M. Cai and K. Hwang, "Distributed Aggregation Algorithms with Load Balancing for Scalable Grid Resource Monitoring", *Int'l Parallel and Distributed Processing Symposium (IPDPS-2007)*, Long Beach, March 27-29, 2007.
101. X. Lou, K. Hwang, and R. Zhou, "Integrated Copyright Protection in P2P Networks", *IEEE First Workshop on Trust and Reputation Management in Massively Distributed Computing Systems*, (TRAM-2007) in conjunction with *ICDCS-2007*, Toronto, June 25-29, 2007 .
102. R. Zhou and K. Hwang, "Global Reputation Aggregation in P2P Systems using Trust-Preserving Overlay Networks", *IEEE Int'l Parallel and Distributed Processing Symposium (IPDPS-2006)*, Rhode Island, Greece, April 25-29, 2006.
103. Y. Chen and K. Hwang, "Secure Joining and Lookup Services from Byzantine Attacks in P2P Networks", *IFIP Int'l Conference on Network and Parallel Computing (NPC-2006)*, Tokyo, Oct. 2-4, 2006.
104. Y. Chen and K. Hwang, "Collaborative Detection of DDoS Flooding Attacks on Community Networks". *IEEE Int'l Symposium on Collaborative Technologies and Systems*, special issue on Collaborative Grids and Community Networks, Las Vegas, NV. May 15, 2006.
105. S. Song, R. Y. Kwok, and K. Hwang, "Security-Driven Heuristics and A Fast Genetic Algorithm for Trusted Grid Computing", *IEEE Int'l Parallel and Distributed Processing Symposium (IPDPS-2005)*, Denver, April 10, 2005.
106. K. Hwang, Y. Kwok, S. Song, M. Cai, R. Zhou, Yu. Chen, Ying. Chen, and X. Lou, "GridSec: Trusted Grid Computing with Security Binding and Self-Defense against Network Worms and DDoS Attacks", *Int'l Workshop on Grid Computing Security and Resource Management (GSRM'05)*, in conjunction with *ICCS 2005*, Atlanta, May 22-25, 2005.

107. Y. K. Kwok, S. Song, and K. Hwang, "Selfish Grid Computing: Game-Theoretic Modeling and NAS Performance Results," *Proc. Int'l Conf. on Cluster Computing and The Grids (CCGrid 2005)*, Cardiff, UK, May 9-12, 2005.
108. Y. Kwok, R. Tripathi, Y. Chen, and K. Hwang, "HAWK: Halting Anomalies with weighted Choking to Rescue Well-Behaved TCP Sessions from Shrew DDoS Attacks", *IEEE ICCNMC 2005*, China, August 2-4, 2005.
109. M. Cai, J. Pan, Y. Kwok, and K. Hwang, "Fast and Accurate Traffic Matrix Measurement Using Adaptive Cardinality Counting", *ACM SIGCOMM Workshop Mine-Net'05*, Philadelphia, August 26, 2005.
110. Y. Chen, K. Hwang, and Y. K. Kwok, "Filtering of Shrew DDoS Attacks in Frequency Domain", *IEEE LCN Workshop on Network Security (WoNS)*, with *IEEE LCN 2005*, Sydney, Australia, Nov. 15-17, 2005.
111. K. Hwang, Y. Chen and H. Liu, "Defending Distributed Computing Systems from Malicious Intrusions and Network Anomalies", *IEEE Workshop on Security in Systems and Networks (SSN'05)*, held in conjunction with *IPDPS 2005*, Denver, April 8, 2005. (keynote paper)
112. Y. Chen, Y.-K. Kwok, and K. Hwang, "MAFIC: Adaptive Packet Dropping for Cutting Malicious Flows to Push Back DDoS Attacks," *Proc. of 2nd International Workshop on Security in Distributed Computing Systems (SDCS'05)*, in conjunction with *ICDCS 2005*, Columbus, OH., June 6-10, 2005.
113. S. Song, K. Hwang, and M. Macwan, "Fuzzy Trust Integration for Security Enforcement in Grid Computing", *IFIP Int'l Conf. on Network and Parallel Computing*, (NPC-2004), Wuhan, China, Oct. 18-20, 2004, pp.9-21.
114. S. Song and K. Hwang, "Trusted Grid Computing with Security Assurance and Resource Optimization", *17-th Int'l Conf. on Parallel and Distributed Computing Systems (PDCS2004)*, San Francisco, Sept.14, 2004.
115. M. Qin and K. Hwang," Frequent Episode Rules for Internet Traffic Analysis and Anomaly Detection", *IEEE Int'l Symp. on Network Computing and Applications (IEEE NCA04)*, Cambridge, MA. August 30, 2004, pp.161-168.
116. K. Hwang, "Wireless PKI and Distributed IDS in Securing Intranets and M-Commerce", Invited Keynote Paper, *Proc. of PDCAT 2002*, Kanazawa, Japan, Sept. 4, 2002, pp. 1-16.
117. M. Gangadharan and K. Hwang, "Intranet Security with Micro Firewalls and Mobile Agents for Proactive Intrusion Response", *IEEE In'l Conf. on Computer Networks and Mobile Computing*, Beijing, China October 16-19, 2001.
118. K. Hwang and M. Gangadharan, "Micro-Firewalls for Dynamic Security with Distributed Intrusion Detection", *IEEE Int'l Symp. of Network Computing and Applications*, Cambridge, MA. Oct. 8-12, 2001. pp.68-79.
119. K. Hwang, H. Jin and R. Ho, "RAID-x: A New Distributed Disk Array for I/O-Centric Cluster Computing", *IEEE 9-th Int'l Symposium on High Performance Distributed Computing (HPDC-9)*, August 1-4, 2000, Pittsburgh, pp.279-286.
120. K. Hwang, Hai Jin and R. Ho, "Reliable Cluster Computing with a New Checkpointing RAID-x Architecture", *The 9th IEEE Heterogeneous Computing Workshop (HCW-2000)*, Cancun, Mexico, May 1, 2000, pp.171-184.
121. R. Ho, K. Hwang, and H. Jin. "Design and Analysis of Clusters with Single I/O Space", *The IEEE 20th International Conf. on Distributed Computing Systems (ICDCS'2000)*, Taipei, Taiwan, pp.120-127.
122. B. Cheung, C.L. Wang, and K. Hwang, "JUMP-DP: A Software DSM System with Low Latency Communication Support", *Proc. of PDPTA 2000*.

123. H. Jin and K. Hwang, "Distributed Checkpointing on Clusters with Dynamic Stripping and Staggering", *ASAIAN 2002*, pp.19-33.
124. H. Jin and K. Hwang, "False Sharing Problems in the Cluster-based Disk Array", *Proceedings of 1999 ACM Symposium on Applied Computing*, March 2, 1999, San Antonio, Texas.
125. H. Jin, and J. Zhang, and K. Hwang, "RAID Reconfiguration Scheme for Gracefully Degraded Operations", *IEEE Proc. of 7th Euromicro Workshop on Parallel and Distributed Processing*, Feb. 3-5, 1999, Funchal, Portugal.
126. R. S. Ho, K. Hwang and H. Jin, "Single I/O Space for Scalable Cluster Computing", *Proceedings of 1<sup>st</sup> IEEE International Workshop on Cluster Computing (IWCC'99)*, December 2-3, Melbourne, Australia.
127. Y. K. Kwok, K. P. Chow, H. Jin and K. Hwang, "Comet: A Communication-Efficient Load Balancing Strategy for Multi-Agent Cluster Computing", *Proc. of Parallel Computing'99 (ParCo'99)*, Delft, The Netherlands, August 17-20, 1999.
128. H. Jin, and K. Hwang, "Performance Effect Analysis of False Sharing Problem in Clusters with Single I/O Space", *Proc. of 1999 Int'l Conf. on Parallel and Distributed Processing Techniques and Applications*, (PDPTA 1999), July 1999, Las Vegas, pp.2788-2794.
129. H. Jin, Q. Chen, and K. Hwang, "Grouped RAID Accesses to Reduce False Sharing Effect in Clusters with Single I/O Space", *Proc. of Int'l Symposium on High Performance Computing*, (ISHPC 1999), May 26-28, 1999, Kyoto, Japan, Lecture Notes in Computer Science, Vol.1615, Springer-Verlag, 1999, pp.328-335.
130. H. Jin and K. Hwang, "False Sharing Problems in Cluster-based Disk Arrays", *Proc. of SAC*, 1999, pp. 461-465.
131. H. Jin, and K. Hwang, "Case Studies of False Sharing Problems in the Cluster-based Disk Array", *Proc. of 1999 ACM Symp. on Applied Computing*, February 28 – March 2, 1999, San Antonio, Texas, pp.461-465.
132. H. Jin, K. Hwang, and J. Zhang, "A New Architectural Reconfiguration Scheme for Continuous Operation of RAID in Degraded Mode", *IEEE Proc. of 7<sup>th</sup> Euromicro Workshop on Parallel and Distributed Processing*, Feb. 3-5, 1999, Funchal, Portugal, pp.66-73.
133. J. Yen, A. Chung, H. Ho, B. Tam, R. Lau, M. Chua, and K. Hwang, "Collaborative and Scalable Financial Analysis with Multi-Agent Technology", *Proc. of HICSS*, Honolulu, 1999.
134. K. Hwang, C. M. Wang, and C. L. Wang, "STAP Benchmark Evaluation of The T3D, SP2, and Paragon", *Proc. of the Tenth Int'l Conf. on Parallel and Distributed Computing*, New Orleans, LA. Oct. 1-3, 1997.
135. K. Hwang, C. M. Wang and C.L. Wang, "Evaluating MPI Collective Communication on SP2, T3D, and Paragon Multicomputers", *Third Symp. on High-Perf. Computer Architecture (HPCA-3)*, Texas, Feb.1997, pp.106-115.
136. Z. Xu and K. Hwang, "Coherent Parallel Programming in C//", *Proc. of APDC*, 1997, pp. 116-123.
137. K. Hwang and Z. Xu, "MPPs and Clusters for Scalable Computing", *Int'l Symp. on Parallel Architectures, Algorithms, and Networks*, Beijing, China, June 12-14, 1996, pp.117-123.
138. K. Hwang, Z. Xu and M. Arakawa, "STAP Benchmark Performance on the IBM SP2 Massively Parallel Processor," *The Third Workshop on Adaptive Sensor Array Processing*, MIT Lincoln Lab. Lexington, MA. March 15-17, 1995.
139. Y. K. Chong and K. Hwang, "Evaluation of Relaxed Memory Consistency Models for Multithreaded Multiprocessors", *Int'l Conf. on Parallel and Distributed systems (ICPADS)*, Taiwan, China, Dec. 19-21, 1994, pp.474-480.

140. K. Hwang, "Scalability and Programmability of Massively Parallel Processors", *Proc. of Int'l Conf. on Parallel and Vector Processing*, (CONPAR), Johannes Kepler Univ., Linz, Austria, Sept. 6-8, 1994, pp. 1-4.
141. K. Hwang, "Crossbreeding Technologies for Scalable Computing and Multimedia Applications", *Proc. of High-performance Computing Conf.* 1994, Singapore, Sept. 29-30, 1994.
142. K. Hwang and C.M. Cheng, "Fuzzy Communication for Guided Loop Scheduling on Multicomputers", *8<sup>th</sup> Int'l Parallel Processing Symposium (IPPS)*, Cancun, Mexico, April 26-29, 1994, pp.439-443.
143. H.C.Wang and K. Hwang, "Multicoloring for Fast Sparse Matrix-Vector Multiplication in Solving PDE Problems", *1993 Int'l Conf. Parallel Processing*, St. Charles, IL, August 19, 1993,
144. Z. Xu and K. Hwang, "Language Constructs for Structured Parallel Programming", *International Parallel Processing Symposium*, (IPPS) March 23-26, 1992, Beverly Hills, CA, pp.454-461.
145. D. K. Panda and K. Hwang, "Message Vectorization for Converting Multicomputer Programs to Shared Memory Multiprocessors", *Proc. of 1991 Int'l Conf. Parallel processing (ICPP)*, St. Charles, IL, August 1991, pp.204-211.
146. S. Shang and K. Hwang, "Wired-NOR Barrier Synchronization for Designing Large Shared-Memory Multi-processors", *Proc. of Int'l Conf., Parallel Processing*, (ICPP), St. Charles, IL. August 12-17, 1991, pp.171-175.
147. S. Toborg and K. Hwang, "Parallel Vision Integration on the AMT Distributed Array Processor", *Proc. of 5<sup>th</sup> Int'l Parallel Processing Symp. (IPPS)*, Anaheim, CA., April 30 - May 2, 1991, pp.178-185.
148. J. Xu and K. Hwang, "Heuristic methods of Dynamic Load Balancing in a Message-Passing Supercomputer," *Proc. of Supercomputing (SC'90)*, New York, Nov. 12-16, 1990., pp.888-897.
149. K. Hwang and J. Xu, "Mapping of Partitioned Program Modules onto Multicomputer Nodes using Simulated Annealing", *Int'l. Conf. on Parallel Processing, (ICPP)*, New York, Oct, 10-12, 1990, pp.292-293.
150. C. M. Cheng and K. Hwang, "Simulated Performance of The USC Orthogonal Multiprocessor in MPMD Mode", *Proc. of Int'l. Computer Symposium*, Hsinchu Taiwan, Dec. 17-19, 1990.
151. K. Hwang and M. Dubois, "OMP: A RISC-based Multiprocessor Using Orthogonal-Access Memories and Multiple Spanning Buses", *Proc. of ACM Int'l Conf. on Supercomputing*, Amsterdam, The Netherlands, June 11-15, 1990.
152. S. Mehrotra, C.M. Cheng, K. Hwang, M. Dubois, and D.K. Panda, "Algorithm-Driven Simulation and Projected Performance of the USC Orthogonal Multiprocessor", *Proc. of Int'l Conf. on Parallel Processing (ICPP)*, St. Charles, IL August 13-17, 1990, pp.244-253.
153. K. Hwang and D. K. Panda, "Reconfigurable Vector Register Windows for East Matrix Manipulation on the Orthogonal Multiprocessor", *Int'l Conf. on Application-Specific Array Processors*, Princeton, Sept. 5-7, 1990.
154. K. Hwang, Haddadi and Chellappa "Viscom: An Orthogonal Multiprocessor for Early Vision and Neural Computing", *Proc. of the 10<sup>th</sup> Int'l Conf. on Pattern Recognition*, Atlantic City, NJ, June 17-21, 1990.
155. K. Hwang, Panda and Haddadi, "The USC Orthogonal Multiprocessor for Image Processing with Neural Networks", *Proc. of 1990 SPIE/SPSE Symposium on Electronic Imaging*, Santa Clara, CA February 1990.
156. J. Xu and K. Hwang, "A Simulated Annealing Method for Mapping Production Systems onto Multicomputers", *Proc. of the Sixth IEEE Conf. on Artificial Intelligence applications*, Santa Barbara, CA. March 5-9, 1990.
157. H.C. Wang and K. Hwang, "A Multigrid Schwarz Alternating Method for Solving Elliptic Problems," *Parallel Computing Conference '89*, Leiden University, The Netherlands, August 29-Sept. 1, 1989.
158. K. Hwang and D. K. Panda, "Optical Arithmetic Using High-Radix Symbolic Substitution Rules," *9<sup>th</sup> Symp. on Computer Arithmetic*, Santa Monica, CA, Sept. 6-8, 1989.

159. K. Hwang and D. Kim, "Augmenting a Multiprocessor with Enhanced Arrays for On-Board Image Processing and Scene Analysis," *SPIE Conference 1058, IS & T High Speed Computing II*, Los Angeles, January 17-18, 1989.
160. D. K. Kim and K. Hwang, "Generalization of Orthogonal Multiprocessor for Massively Parallel Computation," *Symp. on the Frontiers of Massively Parallel Computation*, George Mason Univ. Fairfax, VA, Oct.10-12, 1988.
161. R. Chowkwanyun and K. Hwang "Hybrid Dynamic Load Balancing for Distributed-Memory Multiprocessors," *IEEE Workshop on the Future Trend of Distributed Computing Systems in the 90's*, Hong Kong, Sept. 1988.
162. J. Ghosh and K. Hwang, "Critical Issues in Mapping Neural Networks on Message-Passing Multiprocessors," *15<sup>th</sup> Int'l Symp. on Computer Architecture*, Honolulu, HI, May 30-June 2, 1988, pp.3-11.
163. A. Louri and K. Hwang, "A Bit-Plane Architecture for Optical Computing with 2-D Symbolic Substitution," *15<sup>th</sup> Int'l Symp. on Computer Architecture (ISCA)*, Honolulu, Hawaii, May 30-June 2, 1988, pp.18-27.
164. A. Louri and K. Hwang, "Optical Arithmetic Using Symbolic Signed-Digit Substitution," *1988 Int'l Conf. on Parallel Processing (ICPP)*, St. Charles, IL, August 15-19, 1988.
165. A. Louri and K. Hwang, "New Symbolic Substitution Algorithms for Optical Arithmetic Using Signed-Digit Representation," *SPIE Proceedings*, Vol. 880 Los Angeles, California, Jan. 11-12, 1988.
166. J. Ghosh and K. Hwang, "Optically-Connected Multiprocessor for Simulating Artificial Neural Networks," *SPIE Proceedings*, Vol. 882, Los Angeles, California, Jan. 13-14, 1988.
167. A. Louri and K. Hwang, "A Parallel Architectures for Optical Computing," *Proc. of Third SIAM Conf. on Parallel Processing for Scientific Computing*, Los Angeles, California, Dec. 1-4, 1987, pp.414-418.
168. H. C. Wang and K. Hwang, "An Augmented Tree Multiprocessor for Parallel Execution of Multigrid Algorithms," *Proc. of SIAM Conf. On Parallel Processing for Scientific Computing*, Los Angeles, Dec. 1-4, 1987, pp.424-428.
169. D. Kim and K. Hwang, "Mesh-Connected Array Processor with Bypass Capability for Signal/Image Processing," *Proc. of 21<sup>st</sup> Hawaii Int'l. Conf. On System Sciences*, Kona, Hawaii, Jan. 5-8, 1988.
170. J. Ghosh and K. Hwang, "Hypernets for Parallel Processing with Message Passing," *Proc. of Int'l. Conf. on Parallel Processing (ICPP)*, St. Charles, IL., August 17-21, 1987, pp.810-819.
171. K. Hwang, H. C. Wang and Z. Xu "Evaluating Elementary Functions with Chebyshev Polynomials on Pipeline Nets," *Proc. of 8<sup>th</sup> Symp. Computer Arithmetic*, Como, Italy, May 19-21, 1987.
172. D. Kim and K. Hwang, "Parallel Pattern Clustering on Orthogonal Multiprocessors with Orthogonally Shared memory," *Proc. of Int'l. Conf. on Parallel Processing (ICPP)*, St. Charles, Illinois, Aug. 17-21, 1987, pp.913-916.
173. Hwang, et al, "Opcom: An Architecture for Optical Computing Based on Pipeline Networking," *Proc. of 20<sup>th</sup> Annual Hawaii Int'l Conf. on Systems Sciences*, Jan. 6-9, 1987.
174. K. Hwang and Z. Xu, "Multipipeline Networking for Computing Vector Compound Functions," *Proc. of Int'l. Conf. Parallel Processing (ICPP)*., Aug. 19-22, 1986, pp.495-502.
175. K. Hwang, "Parallel Preprocessing and Postprocessing in Finite-Element Analysis on A Multiprocessor Computer," *Proc. of ACM/IEEE 1986 Fall Joint Computer Conf.*, Dallas, Nov. 2-6, 1986.
176. K. Hwang and P. S. Tseng, "A Multiprocessor for VLSI Image Processing," *Proc. IEEE Workshop on Computer Architecture for Image Processing*, Nov. 1985.

177. K. Hwang and P. S. Tseng, "An Efficient VLSI Multiprocessor for Signal/Image Processing", *IEEE Int'l Conf. Computer Design: VLSI in Computers*, N. Y., Oct. 7-10, 1985.
178. P.S. Tseng, K. Hwang, and V. Prasanna, "A VLSI-Based Multiprocessor for Implementing Parallel Algorithms", *Int'l. Conf. on Parallel Processing*, St. Charles, IL. Aug. 20, 1985, pp. 657-664.
179. K. Hwang and Z. Xu, "Remps: A Reconfigurable Multiprocessor for Scientific Supercomputing," *Int'l. Conf. on Parallel Processing*, August 20-23, 1985, pp102-2111.
180. Z. Xu and K. Hwang, "Multiprocessors for Evaluating Compound Arithmetic Functions," *7<sup>th</sup> Symposium on Computer Arithmetic*, Urbana, IL., June 4-6, 1985, pp. 266-275.
181. W. W. Carlson and K. Hwang, "On Structured Data Accessing in Dataflow Computers," *Proc. of The First Int'l. Conf. on Computers and Applications*, Beijing, China, June 20-24, 1984.
182. C.Y. Chin and K. Hwang, "Connection Principles of Multipath Packet Switching Networks," *11<sup>th</sup> Annual Int'l Symp. Computer Architecture*, Ann Arbor, MI June 4-7, 1983, pp/99-108.
183. V. Milutinovic, K. Hwang, B. Furht, N. Lopez-Benitez, and K. Waldschmidt, "The VM Architecture: A HLL Microprocessor Architecture for Dedicated Real-Time Applications," *Proc. of the Int'l Workshop on High-Level Computer Architecture*, Los Angeles, CA., May 21-25, 1984, pp. 7.20-7.27,
184. C. Y. Chin and K. Hwang, "Prioritized Packet Switching Networks," *Int'l. Conf. on Parallel Processing*, Michigan, August 1984.
185. L. M. Ni and K. Hwang, "Pipelined Evaluation of First-Order Recurrence Systems," *Proc. Int'l. Conf. on Parallel Processing*, (ICPP) Aug. 1983, pp. 537-543.
186. L. M. Ni and K. Hwang, "Pipelining of Vector Reduction Arithmetic," *IEEE Sixth Symp. on Computer Arithmetic*, Aarhus, Denmark, June 20-22, 1983, pp. 144-150.
187. C.Y. Chin and K. Hwang, "A New Routing Algorithm for Packet Switched Computer Communications Networks," *Proc. of National Computer Conference*, AFIPS, Anaheim, CA May 16-19, 1983, pp. 705-719.
188. S. P. Su and K. Hwang, "VLSI Feature Extraction and Pattern Classification," *Proc. Int'l Symp. VLSI Technology and Systems*, Taipei, Taiwan, March 1983.
189. S. P. Su and K. Hwang, "Multiple Pipeline Scheduling in Vector Supercomputers," *Proc. of 1982 Int'l Conf. Parallel Processing*, August 1982, pp. 226—234.
190. K. Hwang, F. A. Briggs, K. S. Fu, and B. W. Wah, "PUMPS Architecture for Pattern Analysis and Image Database Management," *Proc. Workshop on CAPAIDM*, Hot Springs, Virginia, Nov. 1981, pp. 178-189.
191. S. P. Su and K. Hwang, "A VLSI Approach to Pattern Recognition," *Proc. Workshop on Computer Architecture for Pattern Analysis and Image Database Management*, Hot Springs, Virginia, Nov. 11-13, 1981, pp. 168-177.
192. L. M. Ni and K. Hwang, "Optimal Load Balancing Strategies For a Multiple Processor System," *1981 Int'l Conf. on Parallel Processing*, August 25-28, 1981, pp. 352-357.
193. K. Hwang and Y. H. Cheng, "Partitioned Algorithms and VLSI Structures For Large-Scale Matrix Computations," *Fifth Symposium on Computer Arithmetic*, May 18-19, 1981, Ann Arbor, Michigan, pp. 222-232.
194. K. Hwang, B. W. Wah, and F. A. Briggs, "Engineering Computer Network (ECN): A Hardwired Network of UNIX Computer Systems," *Proc. of National Computer Conf.*, AFIPS, Vol. 50, May 1981, pp. 191-201.
195. F. A. Briggs, K. Hwang, and M. Dubois, "Throughput Analysis and Configuration Design of A Shared-Resource Multiprocessor System: PUMPS," *Proc. 8<sup>th</sup> Annual Symposium on Computer Architecture (ISCA)*, May 12- 14, 1981, Minneapolis, pp. 67-80.

196. K. Hwang and Y. H. Cheng, "VLSI Computing Structures for Solving large-scale Linear System of Equations," *Proc. 1980 Int'l. Conf. Parallel Processing*, pp. 86-94, 1980.
197. L. M. Ni and K. Hwang, "Performance Evaluation and Resource Optimization of Multiple SIMD Computer Organizations," *Proc. of 1979 Int'l Parallel Processing Conf.*, August 21-24, 1979, pp. 86-94.
198. K. Hwang, F. Briggs, K. S. Fu, and J. Patel, "PM4: A Reconfigurable Multiprocessor System for Pattern Recognition and Image Processing," *Proc. of National Computer Conf. AFIPS*, June 1979, pp. 255-265.
199. L. M. Ni and K. Hwang, "Modeling and Analysis of Shared-Resource Multiple SISD/SIMD Computer Systems," *Proc. of the Third Int'l Computer Symposium*, Dec. 18-20, 1978, Taipei, China.
200. T. P. Chang and K. Hwang, "A New Interleaved Rational/Radix Arithmetic Systems for High-Precision Computations," *IEEE Fourth Symp. on Computer Arithmetic*, Oct. 1978, Santa Monica, CA pp. 15-24.
201. K. Hwang, "Designing Reliable Microprogram Control with Partitioned Hybrid Redundancy," *Sixth Annual Int'l Symp. on Fault-Tolerant Computing*, IEEE Computer Society, June 21-23, 1976, pp. 45-51.
202. K. Hwang and S. B. Yao, "Parallel Processing of Multiway Search Trees," *Proc. of the Conf. on Computer Graphics, Pattern Recognition and Data Structures*, IEEE Computer Society, May 4, 1975, pp. 170-176.
203. K. Hwang, "Designing Storage/Output for Chinese Input/Output Digital Computers," *Proc. of the First Int'l Symp. On Computers and Chinese I/O Systems*, August 1973, pp. 931-942.
204. K. Hwang, "On the direct-Product of Periodically Varying Sequential Machines," *Proc. of the First Princeton Conf. on Information Science and Systems*, March 1971, pp. 23.
205. K. Hwang, "Some Bounds on the Tails of Power Spectrum," *Proc. of the Second Hawaii Int'l Conf. on System Sciences*, January 1969, pp. 803-806.

### **Ph.D. Thesis Supervision Completed:**

1. **Runfang Zhou**, Ph.D. May, 2007, USC. *Thesis title : Scalable Reputation Systems for Peer-to-Peer Networks*, presently employed at HP Lab., silicon valley.
2. **Yu Chen**, Ph.D. Dec. 2006, USC, *Thesis title : Collaborative Detection and Filtering of DDoS Attacks in ISP Core Networks*, Assistant Professor, Electrical and Computer Engineering, State University of New York, Binghamton, N.Y.
3. **Min Cai**, Ph.D. Dec. 2006, USC, *Thesis Title : Distributed Indexing and Aggregation Techniques for P2P and Grid Computing*, presently employed at EMC, silicon valley.
4. **Shanshan Song**, Ph.D. Dec. 2005, USC, *Thesis Title: Trusted Grid and P2P Computing with Security Binding and Reputation Aggregation*, Presently employed as a Technical Staff Member at Oracle Corporation, San Francisco, CA.
5. **J. C. Liu**, Ph.D. August 1998, USC, *Thesis Title: Performance Evaluation of Branch Strategies in Superscalar Microprocessors*, working in computer industry, Taiwan, China.
6. **C. M. Cheng**, Ph.D, December 1993 at USC, *Thesis Title: Program and Data Distribution on Scalable Multiprocessors*. Presently employed with Advanced Computing Systems Co. in Los Angeles, CA.
7. **Shi-Sheng Shang**, Ph.D. September 1993 at USC, *Thesis Title: Fast Barrier Synchronization in Shared-Memory Multiprocessors*. Manager, Computer and Comm. Res. Lab., Industrial Technology Research Institute, Taiwan.

8. **Scott Toborg**, Ph.D. August 1992 at USC, *Thesis Title: Cooperative Vision Integration: From Neural Network Algorithms to Wafer-Scale Architectures*. Staff Engineer, Hughes Research Laboratories, Malibu, California.
9. **H. C. Wang**, Ph.D. August 1992 at USC, *Thesis Title: Parallelization of Iterative PDE Solvers on Shared-Memory Multiprocessors*. Professor, Dept. of Computer Science at Wu-Fung Institute of Technology, Taiwan.
10. **D. K. Panda**, Ph.D. August 1991 at USC, *Thesis Title: Vectorized Interprocessor Communication and Data Movement in Shared-Memory Multiprocessors*. *IEEE Fellow*, Professor of Computer Science, Ohio State University, Columbus, Ohio
11. **Jian Xu**, Ph.D. August 1990 at USC, *Thesis Title: Load Balancing Methods for Message-Passing Multicomputers*. IBM Fellow, Almaden Research Center, San Jose, California.
12. **Ahmed Louri**, Ph.D. August 1988 at USC, *Thesis Title: A Bit-Plane Architecture and 2-D Symbolic Substitution Algorithms for Optical Computing*. Professor of Electrical and Computer Engineering, University of Arizona, Tucson, Arizona.
13. **Dongseung Kim**, Ph.D. June 1988 at USC, *Thesis Title: Orthogonal Architectures for Parallel Image Processing*. Professor of Computer Science, Korea University, Seoul, Korea.
14. **Raymond Chowkwanyun**, Ph.D. June 1988 at USC, *Thesis Title: Dynamic Load Balancing for Concurrent Lisp Execution on a Multicomputer System*, presently self-employed.
15. **Joydeep Ghosh**, Ph.D. April 1988 at USC, *Thesis Title: Communication-Efficient Architecture for Massively Parallel Processing*. *IEEE Fellow*, Professor of Electrical and Computer Engineering, University of Texas, Austin, Texas.
16. **Zhiwei Xu**, Ph. D. August 1987 at USC, *Thesis Title: Multipipeline and Language Constructs for Vector Processing*. Vice Director, Computing Technology Institute, Chinese Academy of Sciences, Beijing, China.
17. **Chi-Yuan Chin**, Ph.D. December 1983, Purdue University, *Thesis Title: Packet Switching Networks for Multiprocessor Systems*. Manager, Industrial Technology Research Institute, Taiwan, China.
18. **Shun-Piao Su**, Ph.D. December 1982, Purdue University, *Thesis Title: Pipelining and Dataflow Techniques for Designing Supercomputers*. Fairchild Research Laboratory, Palo Alto, CA.
19. **Tian-Pong Chang**, Ph.D. August 1982, Purdue University, *Thesis Title: Reliability Analysis of Multiprocessor Systems*. Member of Technical Staff, Bell Lab, Holmdel, New Jersey.
20. **Lionel M. Ni**, Ph.D. Dec.1980, Purdue University, *Thesis Title: Performance Optimization of Parallel Processing Computer Systems*. *IEEE Fellow*, Professor and Chair of Computer Science, Hong Kong University of Science and Technology, Hong Kong.

#### **Ph.D. Thesis Supervision in Progress:**

21. **Xiaosong Lou**, “Content Poisoning for Copyright Protection in P2P Systems”, USC Computer Engineering, passed Ph.D. qualifying exam. Nov, 2006.
22. **Shuping Liu**, “Peer-to-Peer File Sharing in Mobile Wireless Networks”, USC Computer Engineering, passed Ph.D. Screening Exam in Computer Engineering, Spring 2007.
23. **Hong Zhu**, “Collaborative Honeypot Techniques for Worm Containment and DDoS Defense” passed Ph.D. Screening Exam in Computer Science, Spring 2007.

#### **Research Grants Awarded as Principal Investigator:**

(Totaling US \$ 7 M in 23 Awards from 1975 to 2007)

1. “GridSec: Trusted Grid Computing with Dynamic Resources and Automated Intrusion Responses: NSF Information Technology Research (ITR) Grant No. ACI-0325409, \$2,000,000, 2003 - 2007.

2. "Setup Fund for USC Internet and Cluster Computing Laboratory", Engineering Dean's Office, Univ. of Southern California, \$50,000, 1999 – 2002.
3. "Integrated Information Technology for A Value-Added Economy in Hong Kong", Area of Excellence Development Grant, Univ. of Hong Kong, \$380,000, 1998 - 2001.
4. "Clustering of Symmetric Multiprocessors for Distributed Parallel Processing", Grant from Hong Kong Research Grants Council, \$40,000 Sept. 1997.
5. "Distributed Computing and Multimedia Applications ", Central Allocation Grant from Hong Kong Research Grants Council, \$ 432,000, Feb.1997.
6. "STAP Benchmarking on Scalable Parallel Processors", Subcontract from MIT Lincoln Lab. 1995 - 1997, \$174,000.
7. "STAP Benchmark Experiments on The IBM/SP2 Massively Parallel Processor", subcontract from MIT Lincoln Lab to USC, 1994 -1995, \$150,000.
8. "Viscom: A Multiprocessor System for Image/Vision Processing and Neural Network Computing," NSF Grant No. MIP-8904172 , 1989 - 1992, \$757,000.
9. "Avionics AI Processor Definition," Air Force Wright Aeronautical Lab subcontract from Hughes Aircraft, 1989 - 1991, \$75,000.
10. "Optical Multicomputer Networks for Balanced Parallel Processing," AT & T Grant, 1988 - 1990, \$195,000.
11. Research Donation for funding USC/Alliant Symposium Series on Parallel Processing, Alliant Computer Systems Corporation, Littleton, MA, Nov.1, 1988, \$20,000.
12. "Augmenting a Multiprocessor with Enhanced Arrays for On-Board Image Processing and Scene Analysis," Office of Naval Research, Contract No. N14-86-K-559 , 1986 - 1988, \$318 K.
13. "Multicomputer Architectures for Image Preprocessign and Discrimination," Naval Ocean Systmes Center, Contract No. 85-D-203, July 1, 1986 - Sept. 30, 1987, \$143,000.
14. "Design Mehtodologies for Developing Multiprocessor Supercomputers," NSF Grant DMC-84-21022, 1985 - 1988, \$160,000.
15. "Supercomputers for Solving PDE Problems," AFOSR Grant 85-NM-250, 1985 – 1987, \$165,000.
16. "Computer Architecture Research Laboratory and VLSI Design Laboratory, Equipment grant from AT&T Foundation to USC, Nov., 1985, \$25,000.
17. "Parallel PDE Algorithms and Supercomputer Architectue," Research Contract from AFOSR to Purdue University, 1984 - 1985, \$150,000 (with John Rice).
18. "Large Scale Circuit Analysis on a Cyber 205 Supercomputer," IBM Contract PO709654 to Purdue University, 1981 - 1984, \$260,000, (with P. M. Lin).
19. "VLSI Multiprocessor Architecture and Relational Database For Analysis of Imagery Data," NSF Grant No, ECS-80-16589 to Purdue University, May 1981 - May 1984, \$450,000, (with K. S. Fu and F. A. Briggs).
20. "Intelligent Control and Computer Network Management for Traffic System," DOT Contract No. R920044, US Department of Transportation to Purdue University, 1980 - 1981, \$70,000, (with George Saridis).
21. "A Reliability Study of Multiprocessor Systems, Dvaid Ross Fellowship from Purdue Research Foundation, 1979-1981, \$9,800.

22. "Parallel Algorithms and Computer Architectures for Pattern Recognition and Image Processing," NSF Grant No. MCS-78-18906 to Purdue Univ., 1979 - 1981, US \$210,000. (with T. S. Huang).
23. "Performance Optimization of Parallel Processing Computer Systems," David Ross Fellowship from Purdue Research Foundation, 1975 - 1977, US \$7,800.

### **Courses Taught at Purdue, USC, HKU :**

- Wireless Internet and Pervasive Computing (USC EE532, 2001- present)
- Logic Design and Switching Theory (Purdue, 1974)
- Digital Computer Arithmetic (Purdue 1976, USC, 1986)
- Computer System Organizations (USC EE 457, since 1986)
- Computer Systems Architecture (Purdue 1974, HKU 1996, , USC 1986 - present)
- Parallel and Distributed Computing (USC EE 657, 1987 - present)
- Computer Networks and Clustering (USC, HKU 1997)
- Foundations of Computer Engineering (Purdue EE 608, 1974)
- Fundamentals of Distributed Computing (HKU, 1997)
- Scalable Parallel Computers (HKU, 1998)

### **Invited Lectures, Conference and Consulting Activities:**

#### **Keynote Speeches (delivered from 1984 to 2007)**

- *IEEE International Workshop on Trust and Reputation Management in Massively Distributed Computing Systems (TRAM-2007)*, Keynote address on "Trust and Reputation Management in P2P and Grid Systems," in conjunction with ICDCS-2007, Toronto, June 29, 2007.
- *IEEE International Workshop on Dependable, Parallel, and Distributed Network-centric Systems (DPDNS-2007)*, Keynote address on "Trusted peer-to-peer and grid computing", in conjunction with IPDPS-2007, Long Beach, CA. March 30, 2007.
- *International Computer Innovation 6016 Workshop on Information Intelligence and Internet Security*, Keynote address on "Internet Security and Cyber Trust for Integrated Web Services and P2P Grid Computing", Beijing, China, Dec.4, 2005.
- *IEEE Workshop on Security in Systems and Networks, (SSN'05)*, Keynote address on "Defending Distributed Computing Systems against Malicious Intrusions and Network Anomalies", with *IPDPS-2005*, Denver, CO. April 8, 2005.
- *IFIP International Network and Parallel Computing, (NPC2004)*, "Secure Grid Computing with Trusted Resources and Internet Datamining", Wuhan, China, Oct.18, 2004
- *ISCA International Conference on Parallel and Distributed Computer Systems, (PDCS-2004)*, "Trust management, Resource Fortification, and Internet Datamining for Secure Grid/P2P Computing", S. F. Sept.16, 2004
- *IEEE International Conference on Cluster Computing (Cluster 2003)*, "Distributed Security Enforcement for Trusted Cluster and Grid Computing", Hong Kong, December 2 - 4, 2003.
- *IEEE International Workshop on Grid and Cooperative Computing, (GCC2002)*, Sanya, China, Dec.26, 2002
- *IEEE Int'l Conf. on Algorithms and Architectures for Parallel Processing*, Beijing, China, October 23, 2002

- *Parallel and Distributed Computing Applications and Technologies*, (PDCAT 2002), “Wireless Internet Security for M-Commerce”, Kanazawa, Japan, Sept. 4, 2002, pp.1-16.
- *IEEE International Conference on Parallel and Distributed Systems*, (ICPADS -2001), “Micro-Firewalls and Mobile Agents for Securing Grid, Cluster, and Pervasive Computing”, Chojung, Korea, June 28, 2001
- *IEEE 2000, International Conference on Cluster Computing*, (Cluster 2000), “Internet Security and Firewall Architectures for Reliable Cluster Computing”, Chemnitz, Germany, Nov. 20-Dec.2, 2000.
- *International Workshop on Cluster Computing*, (IWCC 2000), Melburon, Australia, Dec. 2-3, 1999.
- *Int’l Symp. Low-Power and High-Speed Microprocessors (COOL Chips)*, Tokyo, Japan, April 15, 1998
- *IEEE Computer Society 1997 Int’l Conf. on Parallel and Distributed Systems*, Seoul, Korea, Dec 13, 1997
- *IEEE Int’l Conf. on Algorithms and Architectures for Parallel Processing*, Singapore, June 11-13, 1996.
- *National Computer Symposium*, keynote speech on Recent advances in *High-Performance Computer Systems*, Kaoshung, Taiwan, Dec.17-21, 1996.
- *Fifth Int’l Parallel Processing Symp. (IPPS)*, Anaheim, CA, April, 1991.
- *Symp. on Parallel and Distributed Processing Techniques*, Sunnyvale, CA., August 9-11, 1996.
- *National Convention of Computer and Information Technology*, Bangalore, India, Oct. 31-Nov.3, 1996.
- *National Computer Symposium*, Taiwan, China 1984, 1994, 1996
- *High-performance Computing Conference 1994: Challenges into the 21<sup>st</sup> Century*, “Crossbreeding Technologies for Scalable Computing and Multimedia Applications”, National Supercomputing Research Center, Singapore, Sept. 29-30, 1994.
- *European Symp. on Parallel and Vector Processing*, (CONPAR’94), “Scalability and Programmability of Massively Parallel Processors”, Linz, Austria, Sept. 6-8, 1994

#### **General Chair or Program Chair of International Conferences:**

- General Chair, *IEEE Fourth International Symposium on High-Performance Computer Architecture (HPCA-4)*, Las Vegas, Nevada, Feb.1-4, 1998.
- General Chair, *International Parallel and Distributed Computing Symposium (IPDC 97)*, Shanghai, China, March 19-21, 1997.
- Program Chair, *IEEE Tenth International Symposium on Parallel Processing (IPPS 96)*, Honolulu, Hawaii, April 15-18, 1996.
- Program Co-Chair, *International Conference on Parallel Processing (ICPP 86)*, St. Charles, IL. August 15-18, 1986.
- Program Chair, *IEEE Seventh Symposium on Computer Arithmetic (ARITH-7)*, Urbana, IL. June 4-6, 1985.

#### **Consulting and Advisory Work:**

- Chief Scientist, IST International, Inc. Aliso Viejo, CA. 2001-2002
- TriTech Microelectronics, Inc. Singapore, August 1997

- Caltech Jet Propulsion Laboratory, Pasadena, CA., 1992 - 1993.
- MIT Lincoln Laboratory, Lexington, MA., 1993 - 1998.
- IBM Fishkill Facilities, New York, 1982-83.
- Motorola Research Lab., Austin, Texas 1994.
- Electrotechnical Laboratory, Tsukuba, Japan, 1986.
- Fujitsu Laboratory, Kawasaki, Japan 1979.

### Invited Lectures or Short Courses:

- Distinguished Lecture on “Internet Security Cyber Trust for Integrated Web Services and P2P Grid Computing”, Zhe-Jiang University, Hangzhou, China, July 11- 29, 2006
- Distinguished Lecture on “Trusted Grid and P2P Computing”, Tsinghua University, Beijing, China, Dec.5, 2005
- Distinguished Lecture on “Internet Security and Cyber Trust for Integrated Web Services and P2P Grid Computing”, Peking University, Beijing, China, Dec.6, 2005
- Distinguished Lecture on “Trusted Grid and P2P Computing”, Science and Technology University of China, Hefei, China, June 28, 2005
- Distinguished Lecture on “Security Issues in Distributed Supercomputing”, Shanghai Jiaotong University, Shanghai, China, June 27, 2005
- “ Network Security and Trusted Grid Computing”, Sydney University, Sydney, Australia, July 3, 2004.
- “ Research on Trusted Grid Computing”, Melbourne University, Melbourne, Australia, July 10, 2004.
- “ Secure Grid Computing with Trused Resources and Internet Datamining”, INRIA at Sophia Antipolis, Nice, France, July 22, 2004.
- Lecture Series on Grid Computing, Network Security, and Distributed Computing”, Deakin University Distinguished Visitor Program, Melbourne, Australia, May 26 - June 12, 2003
- “Internet Security and Distributed Firewalls for E-Commerce and Cluster Computing”, *Distinguished Lecture Series in Computer Science*, Florida Atlantic Univ., Jan.18, 2001.
- “ Security Issues in Cluster Computing”, National Center for High-Performance Computing, Taiwan, China, Dec.19, 2000
- “*Scalable Parallel Computer Architectures*”, *CERN School of Computing*, Egmond Aan Zee, The Netherlands, September 8-21, 1996.
- *Seminar Series on Scalable Parallel Computing*, MIT Lincoln Laboratory, Lexington, MA. October 1995
- *First Annual Conf. of the Advanced School for Computing and Imaging*, Invited Lecture on Scalable Parallel Computers, The Netherlands, May 16-18, 1995.
- *Short Course on Parallel Computers and Programming Systems*, Institute of Information Science, Academia Sinica, Taipei, Tawan, China, July 8-15, 1993.
- Visiting Professor taught a course on *Multiprocessor Arcitecture and Programming*, National Taiwan University, Taipei, Taiwan, China, Sept. 1991 to Jan,1992

- *Invited Speaker, GMD Symposium in honor of the 80-th birthday of Konard Zuse*, German National Computer Research Center, Bone, German, Oct. 1989.
- Invited Short Course on “Supercomputing Architecture”, *Electrotechnical Laboratory (ETL)*, Tsukuba, Japan. July, 1986.
- *US National Academy of Science Specialist* sent to China teaching a short course an “Local-Area Networks”, and advising Chong-Ching University, Szechuan, China, Dec.8 -30, 1985.
- *IEEE Distinguished Visitor Speaker*, IEEE Computer Society, 1981- 1984
- Invited Speaker, *NATO Advanced Study Institute on Spatially Distributed Image Processing* , Italy, 1983
- Short Course on Advanced Computers and Parallel Processing , *Graduate School of Chinese Academy of Sciences*, Beijing, China, July-August, 1980
- Seminars given as a Visiting Research Fellow, *Institute of Information Science, Academia Sinica*, Taipei, Taiwan, China , Jan.-June, 1980.